



Report of the Department of Agriculture for the year 1942.

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PART I. AGRICULTURE IN NYASALAND.

(For reasons of economy this Report has been abbreviated insofar as it has been possible to do so without detriment to the record of the year's activities. A number of the usual statistical tables, including meteorological data, have been omitted and certain sections of the Report have been curtailed. More detailed information regarding any particular aspect of the work of the Department will be supplied to any interested person, on application to the Director).

STAFF.

After more than 21 years' continuous work in the Protectorate Capt. A. J. W. Hornby, M.B.E., Assistant Director of Agriculture and Chemist, has retired from the service.

Mr. C. B. Garnett, Senior Agricultural Officer, was promoted to Assistant Director. The staff was strengthened by the addition of a Soil Conservation Officer (Captain J. M. Howlett, M.C.) and one Temporary Soil Conservation Supervisor. One Agricultural Supervisor and one Native Tobacco Board Supervisor were released from military service during the year. Eight members of the Department and eight members of the Native Tobacco Board were absent on service with the Forces at the close of the year.

POLICY.

The work of the Department has been directed entirely to the achievement of the maximum contribution to the war needs of the Empire and it is gratifying to be able to record that the concentrated and sturdy efforts of all concerned have met with no little success. Weather conditions were mainly most favourable and contributed largely to the general advancement of crop production. Details of the progress made with the major crops are given later in this Report

but the following brief summary will be of interest. All tea available for export was bought by the Ministry of Supply and the tung oil crop was similarly consigned in accordance with the Ministry's instructions. Tobacco production was the highest yet recorded in the Protectorate and cotton yielded a better harvest than for some years past. The only remaining sisal estate worked at full pressure to supply, mainly, local rope and twine requirements. Further progress was made in the endeavour to render the country independent of imported supplies of wheat flour. A substantially increased tonnage of European potatoes was obtained and a considerable quantity was exported to Portuguese East Africa. The production of plantation rubber from the only estate in the country was stimulated and the collection of wild rubber by natives was organised. The planting of Derris root was encouraged and the co-operation of several estates was secured. Plans for the growing of Pyrethrum were advanced and the experimental raising of Cinchona seedlings undertaken. The Department also commenced the production of vegetable seed at suitable stations. Native food crops were generally abundant and any local shortages were readily alleviated from adjoining areas. The maize harvest was the greatest ever recorded and after all internal requirements had been met it became possible to export more than 5,000 tons to the Rhodesias. An important Order was promulgated under the Native Authority Ordinance which empowered Native Authorities to require unemployed male natives to cultivate land for the production of food crops.

PRODUCTION AND EXPORT.

European production and acreage of the principal crops are given in the following table:

	<i>Acrees.</i>		<i>Yield.</i>	
	1942	1941	1942	1941
Tea ...	19,110 ...	18,751 ...	12,240,179 lb. ...	12,872,412
Coffee ...	63 ...	96 ...	55 cwt. ...	144
Tobacco	8,497 ...	7,856 ...	3,695,104 lb. ...	3,803,884
Sisal ...	821 ...	824 ...	4,892 cwt. ...	6,340
Cotton (lint)	243 ...	157 ...	368 cwt. ...	205
Rubber	1,310 ...	1,310 ...	1,922 cwt. ...	1,749

Native production and numbers of growers for the two principal crops, viz. cotton and tobacco, are shown below.

	<i>No. of growers.</i>		<i>Amount sold.</i>	
	1942	1941	1942	1941
Cotton (seed cotton)	*42,096 ..	34,064 ...	7,691 tons ...	2,901 tons
Tobacco ...	82,788 ...	77,720 ...	9,747 tons ...	8,912 tons

*Approximate.

The exported amounts and values of the various items of agricultural produce and of raw materials were as follows:

	<i>Amount.</i>		<i>Value.</i>	
	1942	1941	1942 £	1941 £
Beeswax	7,366 lb. ...	12,004 ...	307 ...	500
Capsicums and Chillies	27,110 lb. ...	23,242 ...	339 ...	290
Cotton (lint)	2,047 tons ...	558 ...	66,855 ...	18,238
Fibre (all kinds)	148 tons ...	371 ...	2,314 ...	4,450
Potatoes	598,409 lb. ...	168,659 ...	1,335 ...	539
Maize and Maize Flour	7,805,917 lb. ...	— ...	8,712 ...	—
Rubber	186,100 lb. ...	205,875 ...	3,877 ...	4,289
Soya Beans	1,671,308 lb. ...	1,459,540 ...	2,984 ...	2,606
Strophanthus	21,953 lb. ...	14,931 ...	2,195 ...	1,493
Tea	12,382,404 lb. ...	12,282,614 ...	567,527 ...	562,953

Tobacco:—

leaf dark-fired ...	8,960,862 lb.	7,441,496	...	336,032	...	275,056
leaf flue-cured ...	920,089 lb.	2,884,606	...	34,503	...	108,173
leaf air-cured ...	1,230,092 lb.	486,534	...	46,129	...	18,245
strips dark-fired	5,299,148 lb.	5,264,376	...	198,718	...	197,414
strips flue-cured	1,002,412 lb.	260,495	...	37,591	...	9,769
strips air-cured	1,310,023 lb.	1,224,016	...	49,126	...	45,901
Tung Oil ...	45,028 lb. ...	16,612 (seed) ...	...	4,644	...	177
Castor Seed ...	98,248 lb. ...	9,292	...	525	...	39

TOBACCO.

The tobacco crop, which amounted to 25,529,103 lbs. was the largest ever produced in the Protectorate and exceeded the previous high record achieved in 1941 by over three million pounds. This increase was obtained in native-produced fire and air-cured types.

Growing conditions were not altogether favourable and were, in fact, difficult everywhere during the planting season. In the Northern Province excellent conditions thereafter prevailed and a large crop of good quality was marketed. In the air-cured Central Division rainfall was short and the tobacco produced was harsh in texture and short in length. The worst conditions were experienced in the Southern Province and the estate-produced flue-cured crop was much below that of the previous year both in quantity and quality. Fire-cured tobacco in this Province was of medium quality. Actual production of the various types was as follows:—

EUROPEAN.

	1942 lb.	1941 lb.
Flue-cured ...	739,872	3,302,104
Fire-cured ...	2,771,440	389,088
Air-cured ...	183,792	112,892
	<u>3,695,104</u>	<u>3,803,884</u>

NATIVE.

	lb.	lb.
Flue-cured ...	171,295	276,558
Fire-cured ...	18,023,237	15,484,077
Air-cured ...	3,639,467	2,589,047
	<u>21,833,999</u>	<u>18,349,682</u>
	<u>25,529,103</u>	<u>22,153,566</u>

PRICES. Demand throughout the season remained strong and all sound leaf was readily taken up at good prices. On the Auction Floor, all prices increased over those of the previous year except for the poorer quality flue-cured crop which showed a drop of .05d. per lb. Fire-cured prices increased by 1.61d. and air-cured by 1.2d. per lb. over the previous year.

The quantities of the different types sold on the Auction Floor and the average prices paid were as follows :—

	Amount (to nearest 1,000 lb.)		Average price per lb.	
	1942	1941	1942	1941
Fire-cured ...	11,264,000	9,029,000	7.88d.	6.28d.
Flue-cured ...	3,033,000	3,918,000	9.84d.	9.87d.
Air-cured ...	1,101,000	723,000	7.45d.	6.26d.

The number of registered Native Trust Land growers and the average amount of tobacco produced per grower were as follows :—

	<i>Northern Province.</i>		<i>Southern Province.</i>	
1942	47,783	191.1 lb.	14,022	235.7 lb.
1941	47,005	166.1 lb.	9,732	206.4 lb.

The amount of tobacco purchased from growers on Native Trust Land and Private Estates respectively are shown below :—

	<i>Northern Province.</i>		<i>Southern Province.</i>	
	1942 lb.	1941 lb.	1942 lb.	1941 lb.
Native Trust Land	9,131,195	7,807,582	3,305,712	2,008,484
Private Estates	7,233,152	5,953,870	2,163,940	2,579,382
	<u>16,364,347</u>	<u>13,761,452</u>	<u>5,469,652</u>	<u>4,588,230</u>

COTTON.

The cotton crop was the largest to be produced since 1935. The satisfactory prices obtained during the previous season resulted in a marked increase in the number of growers and in the size of gardens, whilst weather conditions during the growing season were mainly favourable and the incidence of pest and disease light.

Details of Trust Land and Private Estate seed cotton production were as follows:—

<i>Southern Province.</i>			<i>Northern Province.</i>		
		tons			tons
Lower Shire	...	1,806	Ncheu	...	94
Chikwawa	...	4,025	Dedza	...	187
Cholo	...	416	Dowa	...	223
Blantyre and Central Shire	...	176	Kota Kota	...	256
Upper Shire	...	177	North Nyasa	...	306
South Nyasa	...	25			
		<u>6,625</u>			<u>1,066</u>

Of the total of 7,691 tons, 1,141 tons were produced by native tenants on private estates. The comparative figures for 1941 were 2,901 and 396 tons respectively.

The crop was again bought in two grades only and the prices offered, by tender, remained unaltered throughout the season. These were between 1d. and 1½d. per lb. for "Good", and approximately ½d. per lb. at all markets for "Ordinary".

Yields and production factors were as follows:—

Area	Yield per acre lb.	Production factor per lb. seed issued	% sold as "Good"
Lower River	212	6.9	93.93
Central Shire	139	5.2	93.51
Central and Northern	318	7.2	95.52
North Nyasa	336	4.4	93.75

European production of seed cotton amounted to 55 tons compared with 31 tons in 1941.

TEA.

It was an extremely difficult year in the tea industry. Even the rainy season was interspersed with dry periods of two weeks or more. These series of checks were not conducive to vigorous growth and it was not until late January that the bushes began to flush vigorously. A good February led up to an excellent March, when more leaf was plucked than in any other month since tea was first planted in Nyasaland. The rains stopped in the middle of April,

however, and no good rain then fell until the last few days in July. The yields from June until the end of September were lower, in some cases, than in 1941. Good rains fell in Mlanje in October and by November the gardens were fresh, vigorous and yielding well. Cholo had less rain than in 1941, which was an exceptionally dry year, and the October-December crop was very poor. After another dry spell in December, the crop fell off in Mlanje but good rains in the latter part of the month improved the prospects for the beginning of 1943. The first good rains fell in Cholo in December but there was little hope that estates in that area could make up lost crop before the cold season began. The outlook for the new crop was not promising therefore, as in addition to drought conditions this year circumstances made it impossible to apply the usual amount of fertiliser. Young tea coming into bearing might, however, offset any big drop during 1942/43.

Nevertheless the plants withstood the drought better than last year, especially in Mlanje, and it was observed that the mat of feeding roots was, generally, established well below the surface.

Extended pruning cycle tea did not suffer to the same extent as last year in Mlanje, but was very slow to break away. In Cholo appreciable areas had to be pruned in December as the drought caused die-back and defoliation. It is unfortunate that two drought years should have followed the more general introduction of this pruning system.

The "Yellows" deficiency disease did not make an appearance until later than was expected. The incidence in Mlanje was less than in 1941, but greater in Cholo, especially in the latter half of the year when the rains failed to break. Areas which had only been lightly fertilised for many years with a sulphur bearing fertiliser began to show second and third stage "Yellows" in late November.

TUNG.

Further development has taken place and new plantings during the year brought the total acreage to 6,640 acres. All the new plantations established have been with the species *Aleurites montana*.

A factory for the extraction of tung oil was in operation for the first time, with the result that the exportation of tung nuts has now ceased. The oil was disposed of in accordance with the wishes of the United Kingdom Ministry of Supply and remunerative prices were received by the growers.

MINOR CROPS.

(a) WHEAT. Further success attended the efforts which have now been made to increase the production of wheat and thus to render the Protectorate less dependent on supplies of imported flour. Native growers achieved the new record of 192 tons whilst a further quantity was produced on European estates in the Southern Province. The modern flour mill, installed in Blantyre during 1941, functioned satisfactorily and places future production on a sound footing.

(b) RICE. Increased production was recorded from a number of districts and approximately 1,166 tons were sold by growers, mostly through organised markets. The main increases were attained in the North Nyasa, Mlanje and the Lower River Districts where rice production is taking an increasingly important place in the local economy. In the main Lake Shore areas yields were light due to adverse weather conditions but the number of growers continues to expand.

(c) ENGLISH POTATOES. Following increased demand planting was once again substantially extended and a record crop of 462 tons passed through the markets in the Dedza and Ncheu Districts. Sales in the Southern Province totalled approximately 170 tons. When local requirements have been satisfied the surplus is exported, mainly to Portuguese East Africa.

(d) MAIZE. The harvest was exceptionally good and the surplus available for disposal after all the internal needs of the Protectorate had been met was the highest ever recorded. Recorded sales in the districts where controlled marketing has been established amounted to 10,685 tons but the total surplus was considerably greater than this figure would indicate. In areas where the Marketing of Native Produce Ordinance has not been introduced no record of the quantity sold is possible but it is known that a substantial tonnage was purchased by estates and other consumers. When all the domestic needs of the Protectorate had been met the Department undertook the purchase of the remaining surplus and for the first time for many years export took place. Before the season closed approximately 3,000 tons had been sent to Northern Rhodesia and 2,000 tons to Southern Rhodesia.

(e) RUBBER. The only European estate in the country worked at full pressure throughout the year and it is estimated that output was approximately 200,000 lbs. Following the demand from the United Kingdom authorities for rubber supplies from all available sources, an organisation was introduced for the collection of wild rubber by natives. Unlike other African territories there are virtually no abandoned or derelict Ceara plantations in the Protectorate and collection was therefore confined almost entirely to vine wild rubber. Collection started in earnest only during the latter part of the year but 18,944 lbs. of ball rubber were collected and graded.

PESTS AND DISEASES.

LOCUSTS. Egg-laying by the Red Locust (*Nomadacris septemfasciata*, Serv.) was confined to the Lower Shire and Chikwawa districts and a small area near Lake Shilwa. Spraying was carried out on hopper bands in the above-mentioned two districts with good results and little damage to crops occurred. Activity and movement of flying swarms from March onwards followed the usual course, a considerable number being reported up to the end of October, many of which had apparently moved out of the Protectorate by the end of the year. Egg-laying by these adults (16th generation) began in mid-November in the Chiromo area and continued in the two southern districts during December. Hoppers (17th generation) began to hatch in mid-December and spraying operations were started. The western part of the Chikwawa district was laid over later on and hopper bands were fairly numerous. Some damage to maize on the boundary between the South Nyasa and Upper Shire districts by a late flying swarm was reported in January, 1943, and egg-laying occurred here also.

CROP PESTS. Swarming Caterpillars (*Laphygma exempta*, Wlk.) on cereal crops in April, a rather unexpected heavy attack by Gelatine Grub (*Niphadolepis alianta*, Karsch.) on a portion of one tea estate in Cholo in August, and Stalk Borers (*Chilo suppressalis*, Wlk. and *Proceras argyrolepidia*, Hmps.)* on sorghums in the Lower River district were the main pests.

It is gratifying to be able to record that, owing to the willing co-operation of the entomological authorities of the Union of South Africa Government, the restriction on the import of cotton lint from Nyasaland into the Union on account of the presence of Pink Bollworm (*Platyedra gossypiella*, Saunders.) was removed at the end of the year for saw-ginned, high-density baled lint harvested more than four months. Examination of cotton gardens and seed cotton at ginneries in the Lower Shire and Chikwawa districts indicated that Pink Bollworm was scarce; only two pupae, four live and eight dead larvae being obtained in 295 boy/days work.

It may be noted here that during the period of issue of condensed departmental annual reports, a full manuscript report is submitted by the Entomologist annually to the Imperial Institute of Entomology, London, and is summarised in the Review of Applied Entomology, Series A.

PLANT DISEASES. General investigations of fungus diseases were carried out by the Agricultural Officer, Mlanje, as they arose.

PART II. WORK OF THE DEPARTMENT.

MAKWAPALA AGRICULTURAL TRAINING CENTRE.

The first two-years' course was completed in August, 1942, and it will be of interest briefly to record the work and development of the school and the results so far achieved.

FINAL EXAMINATION. At the completion of the first two-years' course 17 students of the original (1940) group sat for the Final Examination. A panel of examiners was appointed to act conjointly with the Agricultural Officer, Makwapala; the members being the Protectorate Tobacco Officer and the Provincial Agricultural Officers, Southern and Northern Provinces. The written part of the examination consisted of seven papers: viz: Soils, Crops, Plant Life, Insect Life, Livestock, Animal Physiology, Mensuration. Nine of the students qualified and of these eight were thereafter posted to district duties under Agricultural Officers and one, the best all-round student, joined the teaching staff at Makwapala.

The result of this examination, although disappointing from some aspects, was not altogether unexpected and the pass-standard originally decided upon was not modified by the examiners when drawing up the final pass-list, since there is every indication that it can well be attained by the students. Of the students who failed, one has obtained employment in a Company operating large estates, and all but two of the remainder are known to have found posts without difficulty.

*Bull. Ent. Res. 33, pp. 39-40.

STUDENTS. The third session at Makwapala opened in October, 1942, with a group of new students who represented a departure from the two previous groups (1940 and 1941) in that they were all drawn from among the existing staff of agricultural instructors. A qualification of Std. III was laid down and preference was given to instructors who had already served for a number of years. These men were somewhat older than the students previously accepted, but they had the advantage of a sound background of practical experience upon which to base their learning. The fact was not overlooked that the majority had left their school-days far behind, and some modifications were made in the content and presentation of some of the courses in order to adjust the classroom instruction to suit the average learning capacity of the group.

All 17 students of the 1941 group have entered upon their second and final year preparatory to sitting for the Final Examination in September, 1943. These students have done consistently good work in their first year and their average standard of attainments is very definitely above that of the previous (1940) group. Although Std. IV was the minimum required for their year of entrance, nearly half their number had passed Std. VI, and others Std. V. They qualified for entrance in December, 1941, from among 37 candidates who came for the probationary course of six weeks' duration, and it may be said that they represent the first-comers of a better-educated and more enterprising type of young African now becoming attracted to this new branch of the Native Civil Service.

INSTRUCTION. A new and revised syllabus, based upon experience gained during the first eighteen months' operation of the Centre, was drawn up by the Agricultural Officer.

Practical dairying has now become a regular feature of the work of second-year students since the arrival of a small cream separator and a minimum of butter-making equipment. All that remains to be done in this connection is to improve the milking cattle and funds provided for 1943 will make this possible. A drastic culling of the present poor stock will be carried out and "new blood" in the form of selected cows of native stock, together with a suitable bull, will be purchased with a view to grading-up the progeny and establishing a useful herd.

Instructional work by students among neighbouring villages has been extended, and has been specially related to soil conservation in connection with the recent legislation affecting the area. Relations between the Centre and neighbouring village headmen continue to develop satisfactorily. At the request of the native-owner of a considerable acreage of plough-land, students laid out large-scale contour bunds on his property. Contour bunds have also been marked out upon a neighbouring European estate.

SCHOOL VILLAGE. During the months May to October, fifteen two-roomed, pise-de-terre houses were added to the second half of the School Village, bringing the total number of houses up to 33. As in the previous session, the students again played a large part in all aspects of this work.

The satisfactory position has now been reached of having individual houses for all married students, while the few who have not brought their wives to live at the Centre are well provided for by sharing a house between each two. The dormitory system—which is to be condemned from all aspects—has been finally abolished. There is already abundant evidence that the good quarters now available to all students at Makwapala are achieving an important educational aim by fostering a sense of family, as well as communal, pride and responsibility in the houses and their surroundings. It is a matter of no small importance for the standard of the future instructor-staff that this outlook should not again be lost; and it is earnestly to be hoped that all students who qualify at Makwapala will be provided with houses of which they may justly be proud wherever they may be stationed.

SCHOOL COMMITTEE. The work of this body of eight, under the leadership of a School Chief, deserves mention. Each School Chief holds office for two months; and successive chiefs are elected by the students. The Chief in turn nominates candidates for the Committee, who are then put up for election. This experiment of delegating certain responsibilities relating to discipline, food inspection, maintenance and inspection of the School Village, guardianship of school property, and recreations, which was begun early in 1941 has latterly, under a succession of School Chiefs drawn from the 1941 group, proved an unqualified success. The Committee is now an instrument affording real assistance to the Agricultural Officer, while its educational value needs no emphasis. The excellent record of the School Committee during the latter half of 1942 represents a sound example for the new students to uphold.

HANDICRAFT CLASSES for the wives of students were begun experimentally at the beginning of the new session, and this work was undertaken voluntarily and unofficially by the Agricultural Officer's wife. Attendance is voluntary and the women defray the expenses of materials. By general request these classes will be continued and developed. A request from the students that a school should be started for their children is under review.

CONCLUSION. Among the developments outlined above, the importance of the growth of the School Village cannot be over-emphasised. Makwapala may claim to have grown from being an Experimental Station with a classroom attached, into an agricultural training community in which the village serves as a focus for the broader cultural aspects, fostering communal responsibility and enterprise. This important educational aim, though necessarily subsidiary to the main technical training, at the same time lends an essential balance to the education given at Makwapala and will repay further development.

It is worth recording that all Agricultural Officers speak highly of the ability of the Instructors who have been trained at Makwapala.

MARKETING OF NATIVE CROPS.

No important changes were effected in the system which had operated successfully in the two previous years except that, in view of the necessity for economy in the use of motor vehicles and petrol, the purchase of produce on estates was again permitted. The application of the Marketing of Native Produce Ordinance was extended to cover additional areas and several crops were added to the schedule of controlled products.

Marketing organisation generally has again become a normal function of the Staff of the Department and the post of Marketing Officer has been abolished.

The arrangements for the marketing of the cotton crop caused some initial anxiety but, in the event, the anticipated difficulty in disposing of the crop did not materialise. The Auction system was temporarily suspended and the harvest was purchased by local ginners, by tender.

The Kota Kota Rice Society, previously the responsibility of the Marketing Officer, was registered as a Limited Liability Company on the 1st July, 1942. This innovation was adopted mainly to facilitate the administration of the Society's affairs. The Ordinary shares may be held only by *bona fide* rice growers and in order to safeguard the interests and policy of the new Company, the majority on the Board of Directors is composed of Government Officials.

EXPERIMENTAL STATIONS.

The shortage of fully trained staff has necessitated the continued curtailment of experimental work on a number of stations. Only minor operations have been possible at Nehenachena, Tiwi and Karenga, whilst work at the Zomba and Likuni Stations was mainly concerned with the production of tobacco seed and seeds of various native food crops.

PORT HERALD. Long-term experimental work has been initiated on the station to gain some definite information on the relative value of burying, burning and composting crop residues and of digging in a green manure. Mixed sorghum and bulrush millet, the standard crop of the district, is being used: a uniformity trial has been carried out during the past two seasons. In a groundnut variety trial bunch types gave significant heavier yields than the local creeper type, the latter being much more badly attacked by rosette. Observations on sorghum and pulse varieties were continued and trial plots of jute were established, good samples of fibre being obtained. Compost manufacture on a large scale continued. Fifteen acres were kept under elephant grass fallows and five under grass fallows of *Urochloa mosambicensis*.

MASAMBANJATI. As forecast in last year's report, the older coffee bushes are past any aid and have been removed. Supervision has been difficult and until the war is over it is not anticipated that much detailed experimental work on coffee can be undertaken. Derris has been established and the station will be used as a source of planting material for distribution to Estates. A large number of "Queen" pineapple suckers have been distributed.

NKHANDU. This station is being developed under the direction of the Agricultural Officer, Nehen. A small herd of cattle is being built up and methods of mixed farming are demonstrated. Variety trials with various food crops were undertaken and particular attention was given to the training of instructors in soil conservation and the making of compost.

TEA EXPERIMENTAL STATION: MLANJE.

The experimental programme described in the Annual Reports for 1940 and 1941 was continued and investigational work was carried out on manuring, pruning, plucking and cultivation. The average yield of made tea on the station was 1,101 lbs. per acre. Climatic conditions were disappointing and the increasing difficulty of obtaining supplies of a sulphur-bearing fertiliser, necessary for the prevention of "Yellows" disease, gave considerable cause for anxiety, both on the station and on tea estates generally. Two drought years in succession have had an accumulative effect and second stage "Yellows" has begun to appear. The following new experiments were started:—

(a) Tipping and Type of Pruning Trial. This experiment was designed to investigate the effect on the yield of China jat tea, commonly called "local" jat, of different heights of tipping and different methods of pruning.

(b) Manurial Trial and "Yellows" Investigation. This experiment was designed by Dr. Black to investigate the relative response of tea to two types each of nitrogenous, phosphatic and potassic manures and combinations of the six fertilisers. Special records will be kept of the incidence of the "Yellows" sulphur deficiency disease as only three of the fertilisers contain available sulphur.

(c) *Armillaria mellea* investigation. A trial was undertaken on the effect of ring-barking virgin forest three years before felling, on the incidence of *Armillaria* disease.

(d) Three experiments to investigate tea nursery technique were commenced.

The results of an investigation, carried out for a period of five years, into extending the pruning cycle of young tea, were published in the Nyasaland Quarterly Agricultural Journal Vol. 3, No. 1. New results confirm the conclusion reached in 1938 that it is an economic proposition to allow Indian tea to run for three years unpruned and give the additional information that there is an accumulative improvement in the size and health of the tea bush and that unpruned tea in the fifth year still shows a significantly greater yield than yearly pruned tea.

The impossibility of obtaining special fertilisers resulted in certain treatments in some of the established experiments having to be discontinued.

Subsidiary work on the station consisted of trials with various native food crops and the production of vegetable seed and budded citrus. All available land was planted with food crops. The compost training course was continued and a further number of Instructors were trained for employment in compost making on tea estates.

TUNG EXPERIMENTAL STATION, CHISAWANU, CHOLO.

The development of this station has continued smoothly and though the prevailing shortage of labour necessitated a considerable reduction in the new acreage which it had been intended to plant during the year a total of 45 acres is now under cultivation. The house, office and store were completed and work continues on the provision of permanent accommodation for the station labour.

Experiments to test the merits of various vegetative propagation methods were instituted but the earliest results will not become available until 1943 when the trees will bear their first crop. Meanwhile yield recording, with the object of selecting propagating material from the best mother trees in the Protectorate, has continued on an extended scale and provisional selections have been made from a survey of more than 9,000 *montana* trees on 13 estates. Records from existing selections of *fordii* trees were maintained but as it is now evident that this species is definitely inferior to *montana* under Nyasaland conditions it is not proposed to extend the experimental or investigational work on it.

Clone testing was pursued and a number of two year old buddings, representing a number of clones, came into flower and set fruit. It was particularly important to find that in all clones the flowering was predominately female, thus showing that the buddings are reproducing this most valuable characteristic of the mother trees. It will be several years before any definite conclusions can be drawn regarding the cropping of buddings as compared with that of seedlings, but there are already clear indications that the former will give a very considerably greater yield. Further evidence of the value of budding has been provided by the results obtained from the earliest trials of topworking established male trees with buds from heavy yielders and it has been shown that the method is successful in converting these males into bearing trees. More detailed experiments on topworking are in progress.

Artificial crossing and selfing of high yielding trees has been commenced in order to raise a small number of legitimate seedling families from which it is hoped subsequently to produce improved planting material by vegetative propagation from the best individuals.

Cultural and manurial experiments, commenced in the previous year, were maintained, but as the trees will not come into bearing until 1943 observations are so far confined to vegetative differences.

A further investigation consisted of detailed observations on flowering, pollination and fruit setting. In the case of seedling plantations, which normally contain 40 to 50 per cent. of male trees, it was confirmed, as was to be expected, that pollination is adequately provided for. With budded plantations the evidence obtained justified the conclusion that the provision of 5 per cent. of male trees will assure satisfactory pollination, provided that some of the male trees have an early flowering habit. The inclusion of some early flowering males is desirable in view of the fact that the majority of the male flowers produced on bearing trees are not opened until the latter part of the flowering season.

Germination experiments, involving seed treatments and methods of storing seed, also received attention at the station which, in addition to the Tung work, housed trial and multiplication plots of other crops, e.g. pulses, potatoes, cinchona and pyrethrum. The production of vegetable seed was also undertaken.

EMPIRE COTTON GROWING CORPORATION.

NEWALE EXPERIMENTAL STATION. The Cotton Specialist, Mr. H. C. Ducker, whose full report will be published in the usual manner by the Corporation, has provided the following note on the work at the station:—

“Work on general agricultural problems connected with cotton has made good progress, particularly that connected with “rest cropping” for the restoration of soil fertility and the relationship between cotton and the main rotational food crops. A minimum rest period of three years is now recommended in a cropping cycle of eight years. Work with the “920” strain of U.4. cotton has been carried to the large scale commercial stage in the S. W. Lake shore area; 100 tons of seed being available for distribution in 1942/43, but it is not thought that this cotton will be suitable for the Lower River areas. On the Domira Bay Station straight U.4. types are taking second place to superior cotton selected from the Crown Land commercial U.4. mixture and to certain East African Upland types. One of the latter, Mz.561, is outstanding in its combination of good agricultural and lint characters. It has proved suitable for a wide range of conditions in the Central and Lower River cotton areas.”

PEST CONTROL. Mr. E. O. Pearson, the Corporation's Senior Entomologist in the Protectorate, reports as follows:—

“Research has been concentrated on the Red Bollworm and Stainer problems in the Lower River crop. Records have been maintained of insect populations and crop development and loss in sample gardens selected on the basis of a crop census in seven typical areas, with all relevant meteorological data. Experiments on time of planting of cotton and maize and their interaction, analysed by taggings, were continued at the Chiromo sub-station. Pupation records were continued at several points and studies also made of pupal mortality. The relation of stainer breeding to eco-climate was investigated under field conditions and records instituted on wild host plants. These and previous years' observations suggest certain control measures, the choice amongst which hinges on the diapause problem in Red Bollworm. Investigations on the effect upon this of temperature and nutrition have commenced, the former involving the design and construction of much apparatus for temperature control, which has been successfully completed. At the end of the season a field and ginnery survey was carried out on behalf of the Department of Agriculture to determine the status of Pink Bollworm, the material collected being forwarded to the Government Entomologist for examination.”

SOIL CONSERVATION.

The appointment of a whole-time Conservation Officer has allowed more detailed attention to be given to the problems of erosion than was previously the case. This officer made his headquarters in the Cholo District where, as recounted in the previous report, a team of departmental officers had been (in part time) engaged on ameliorative measures in one of the most seriously

affected areas in the Protectorate. The problem here, as in other places, is mainly one of congestion and uncontrolled immigrant settlement, and before the year closed remedial proposals had been submitted to Government by the Agronomic Sub-Committee. Controlled re-settlement is held to be a pre-requisite of restorative action in the area and a preliminary survey of land considered suitable for the excess population was undertaken.

The following extract from a report by the Soil Conservation Officer is of interest:—

“The result (*i.e.* of uncontrolled immigration) has been an extraordinary congestion of population in certain districts, amounting often to as many as 600 persons per square mile, or more. Since this overcrowding is most marked in the hilly areas, where the land requires the most careful treatment, the results are very alarming.”

In the Northern Province a very interesting and successful project is the Misuku Land Scheme. This is now in the fourth year of a five-year plan. Denudation had proceeded so far in 1938 that it was thought that only a complete evacuation of the population could save the area. The conservative measures undertaken included the usual ones, such as contour-ridging etc: but in addition contour grass strips have been established; a practice which it has been found most difficult to persuade cultivators to adopt in other parts of the country. Furthermore, all cattle, apart from a few milch cows, have been moved to communal kraals, and grading is controlled. Grass-burning was completely prohibited for two years. It is stated that, while the prohibition was in force, not a single case of burning occurred, an experience which must be almost unique. What is an even more significant achievement is that the cultivators realise that these measures have been beneficial and, it is hoped, may shortly be trusted to maintain and extend them with no more than ordinary supervision.

Financed by a grant from the Native Welfare Fund, intensive conservation work has continued in the Ncheu District and a substantial number of native gardens have been protected. This work is under the guidance of the Agricultural Officer who has now trained many instructors for service either with the Department of Agriculture or with Native Authorities.

Throughout the Protectorate field officers of all departments have paid continuous attention to the protection and fertility of the soil and no little progress has been achieved. Control measures have included ridge cultivation on the contour, burial of crop residues, encouragement of leguminous crops and control of grass burning. With the exception of the last-named all have been adopted on a large scale.

REPORT OF AGRICULTURAL CHEMIST AND RESEARCH OFFICER.

The routine testing of soils, fertilisers, compost, water and viscera was continued. Local fertiliser materials tested were bird guano from Mbwadzulu Island, apatite, tobacco ash, bone ash and cotton seed. Sunflower seed was pressed for oil which was tested for cooking, burning and soap making. Many samples of charcoal were analysed to ascertain their suitability for producer gas production. Considerable quantities of wild rubber were received for testing and grading. Much time was occupied in obtaining supplies of fertilisers for the tea and tobacco estates.

ACKNOWLEDGMENT.

I desire once again to place on record the appreciation felt by myself and by the staff of the Department towards all those who have assisted and co-operated so fully and freely in the further development of the agricultural resources of the Protectorate. The production programme confronting Europeans and Africans alike has been greater than ever before, whilst staffs and man-power for all purposes have been depleted. Climatic conditions were generally good and favourable to production but it is certain that such progress as has been achieved would have been impossible had it not been for the zeal and energy with which all concerned have faced their various tasks.

A. S. RICHARDSON,
Director of Agriculture.